Built to Serve Society

Images from the Landsat program have become essential for many organizations and applications. Each user community has specific requirements for the quality and content of the data that comprise those images. Many applications require comparisons between current imagery and past imagery, thus placing a priority on acquiring comparable, well-calibrated data mapped consistently to the Earth's surface. All users need free access to both current and past imagery. In some cases, such as fire and crop monitoring, user communities need data soon after acquisition.

Glossary of Requirements

Revisit Time
The time that elapses between two consecutive overpasses of a location. Because of cloud cover, the period between clear observations for an application may be longer than the revisit time. To get seasonal observations, the satellite must acquire several images during the season to increase the likelihood that the area will be cloud free during at least one overpass per season.

Spatial Resolution
Spatial resolution refers to the amount of detail shown in the image or the size of a pixel on the ground. For most LDCM observations, each pixel on the ground is 30 meters by 30 meters, about the size of a baseball diamond.

Spectral Coverage
Most applications require observations in specific wavelength regions of light. Spectral coverage refers to the range of wavelengths observed by a sensor. In the table, Vis refers to visible light, NIR refers to near infrared, SWIR refers to short wave infrared, and TIR is thermal infrared. LDCM collects data for multiple spectral bands within each region.

Geolocation
Geolocation is the accuracy with which each pixel in a satellite image is mapped to the Earth's surface. Pixels within LDCM images are referenced to within 12 meters of their actual location. Coregistration from scene to scene acquired on different dates is important so that users can compare scenes and know that they show the same location on the ground.

Radiance calibration
Landsat pixel values record the absolute intensity of light received by the sensor. Radiance calibration refers to the accuracy with which the sensor records that intensity. Five percent radiance calibration required by most applications is the uncertainty relative to the actual intensity.

Data Digitization
The number of bits used to represent each pixel value in an image. The number of bits reflects the sensitivity of the data to the intensity of light received by a sensor. As an analogy, six-bit data, providing integer values between zero and 63, are required to record the range of measurements available from a foot-long ruler marked every quarter inch (48 gradations). Eight-bit data, zero to 255, are necessary to record the range of measurements available from a one-foot ruler marked every sixteenth inch (192 gradations).

LDCM Characteristics vs. Application Requirements

Application Area	Spectral Coverage				Spatial Resolution					Revisit Time				Geolocation	Radiance Calibration	Data Digitization	
	Vis	NIR	SWIR	TIR	<10m	<20m	<30m	<60m	<100m	<4 Days	<8 Days	<16 Days	<30 Days	≤15 m	≤5%	≥8 bit	≥12 bit
LDCM						15 m pan band	30m Vis, NIR & SWIR Bands		100m TIR bands		with Landsat 7	LDCM alone		12 meters	≤5%	≥8 bit	12 bit
Fire									X								
Land Use									X		X						
Water Use									X	X	X						
Food										X							
Ecosystems										X							
Forests																	

Solid Gray = requirements
X = desired characteristics

The Landsat Data Continuity Mission meets many, but not all, of users' growing requirements. This table compares the satellite's capabilities with data requirements from select user communities. Data in the table come from an informal survey of users within national land management agencies. Requirements are not discussed in detail.